Government Property Agency

AtkinsRéalis



MANCHESTER DIGITAL CAMPUS

Environmental Statement

Volume 2 - Chapter 12: Ground Conditions and Contamination

NOVEMBER 2024

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Executive Summary

Considering ground conditions in an Environmental Impact Assessment (EIA) is crucial for ensuring the safety and stability of structures, protecting environmental resources, safeguarding human health, complying with regulations, managing costs, and promoting sustainable development. By thoroughly assessing ground conditions, potential risks related to soil erosion, contamination, and ground stability can be identified and mitigated effectively.

The Ground Conditions and Contamination Chapter for the Manchester Digital Campus highlights several potential impacts. Historically, the Site was used for various industrial activities, including foundries, mills, and timber yards, which have the potential to have left behind contaminants in the soil. Key contaminants identified include asbestos, arsenic, hydrocarbons, and other industrial chemicals. Additionally, the site contains areas of made ground, which are man-made deposits that can affect ground stability.

The presence of these contaminants poses a low risk to the general public due to the current hardstanding, which limits exposure. However, construction workers may be exposed to these contaminants during excavation and construction activities, making proper safety measures and protective equipment essential. Once the Site is developed, it will be safe for use with minimal risk to future occupants and visitors.

Environmental resources will also be affected. Construction activities may cause temporary soil erosion and disturbance, but measures will be taken to minimize this impact. There is a low risk of contaminants leaching into groundwater or nearby canals, and proper management and mitigation strategies will be implemented to protect water quality. The Site currently has limited vegetation and wildlife, so the impact on local ecology is minimal.

To mitigate these issues, several measures will be implemented during and after construction. During construction, dust suppression techniques will be used to prevent the spread of contaminated dust, and hazardous materials will be stored and handled safely. Regular monitoring and risk assessments will ensure safety. Post-construction, proper landscaping and soil management will prevent erosion, and ongoing monitoring of soil and water quality will ensure long-term safety.

In conclusion, the redevelopment of the Manchester Digital Campus will be managed carefully to address historical contamination and ensure the safety of workers, future users, and the environment. With the proposed mitigation measures, the project is expected to have no significant long-term negative effects.

12. Ground Conditions & Contamination

12.1. Introduction

12.1.1. This chapter of the Environmental Statement (ES) assesses the likely effects of the Proposed Development with respect to ground conditions and contamination. It outlines the assessment methodology, describes the existing baseline conditions, identifies potential impacts and provides an assessment of effects. The chapter also details the mitigation measures necessary to prevent, reduce, or offset any significant adverse effects, and discusses the likely residual effects after these measures have been implemented.

12.1.2. This chapter reports on two different types of cumulative effects: intra-project cumulative effects, which are the combined effects of individual topic impacts on a particular sensitive receptor; and inter-project cumulative effects, which consider the way in which the Proposed Development may give rise to impacts in combination with other developments the study area, termed Reasonably Foreseeable Future Projects (RFFPs). The outlined cumulative effects are then used to inform the overall assessment of cross-topic cumulative effects, which is reported in ES (Volume 2) Chapter 22: Cumulative Effects.

12.1.3. This chapter is supported by a technical appendix contained within ES (Volume 4) Appendix 12, which includes the following:

- ES (Volume 4) Appendix 12.1 – e3p Phase I and II Geo-environmental Site Assessment;
- ES (Volume 4) Appendix 12.2 – AtkinsRéalis (formerly Atkins Limited) Ground Investigation Report; and
- ES (Volume 4) Appendix 12.3 – Conceptual Site Models (CSMs), Impact Assessment Table and definitions of Probability and Consequence for Land Contamination.

12.2. Competent expert evidence

12.2.1. This ground conditions and contamination assessment has been undertaken by:

- An Environmental Management Apprentice who has over 4 years of knowledge and experience in ground conditions and contamination assessment and has used their knowledge and professional judgement to undertake this assessment.
- A Chartered Environmentalist (BSc, CEnv) who holds full professional membership with the Institution of Environmental Sciences. They have over 18 years of knowledge and experience in ground conditions and contamination assessments and have used their knowledge and professional judgement to undertake this assessment.
- A Chartered Environmental Manager (PhD, MSc, BEng, MCIWEM C.WEM, CEnv, CEng, SiLC, SQP) who holds full professional membership with the Chartered Institute of Water and Environmental Management (CIWEM) and the Society for the Environment. They have nearly 30 years of knowledge and experience in ground conditions and contamination assessments and have used their knowledge and professional judgement to undertake this assessment.

12.3. Relevant legislation and guidance

12.3.1. Table 12-1 below summaries the legislation and regulations applicable to ground conditions and contamination.

Table 12-1 – Legislation and guidance for ground conditions

Legislation/regulation	Summary of requirements
National	
National Planning Policy Framework[1] (NPPF) 2023	The NPPF sets out the Government's interpretation of the planning system and identifies main policy objectives and principles. In relation to ground conditions, paragraph 180 states that policies should contribute to and enhance the natural and local environment by: ▪ protecting and enhancing sites of geological value and soils; and ▪ remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate. Paragraph 189 states local planning policies and decisions should ensure that: ▪ the site is suitable for its proposed use, taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposed land remediation; ▪ after remediation, as a minimum, land should not be capable of being determined as Contaminated Land as defined under Part 2A of the Environmental Protection Act (as amended); and, ▪ adequate site investigation information, prepared by a competent person, is available to inform these assessments.
Environmental Protection Act (EPA), 1990[2]	The EPA defines, within England, Wales and Scotland, the fundamental structure and authority for waste management and control of emissions into the environment. Part 2A of the EPA introduced a statutory regime for the identification and remediation of 'Contaminated Land'. It introduced, for the first time in the UK, a statutory definition of 'Contaminated Land' based on significant harm or the likelihood of significant harm (including risks to human health) or the pollution or likely pollution of controlled waters.
Contaminated Land (England) Regulations, 2006[3]	Makes provision for the identification and remediation of contaminated land under Part 2A of the EPA 1990.
The Water Environment (Water Framework Directive (WFD) (England and Wales) Regulations, 2017[4]	These regulations establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. It requires environmental objectives be set to ensure that good status of groundwater is achieved and that its deterioration is avoided. This includes that; ▪ any upward sustaining trend in the concentration of a pollutant must be identified and reversed;

[1] National Planning Policy Framework - Guidance - GOV.UK (www.gov.uk)

[2] Environment Agency (in this Part 2 A (Environmental Protection Act 2020) Environmental Protection Act 1990 (legislation.gov.uk) [Accessed 06 February 2024].

[3] Gov.uk (2006) https://www.legislation.gov.uk/uksi/2006/1380/introduction [Accessed 06 February 2024].

[4] Gov.UK (2017) The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (legislation.gov.uk) [Accessed 06 February 2024]

Legislation/regulation	Summary of requirements
	▪ a good status of groundwater requires early action and stable long-term planning of protective measures, owing to the natural time lag in its formation and renewal; and ▪ monitoring programmes should cover monitoring of the chemical and quantitative status of groundwater.
River Basin Management Plan (2022)[5]	Describes the framework used to protect and improve the quality of waters in each river basin district.
Wildlife and Countryside Act, 1981[6]	Sets out the legislative framework for the protection of geological features of special interest.
Regional / Local	
Manchester City Council Core Strategy Development Plan 2012-2027	Since the adoption in March 2024 of the Places for Everyone (PfE) Joint Development Plan, policies EN15 and EN17 below have been partially replaced by Policy PfE JP-G8. The revised policies state that: ▪ Policy EN15 Protecting Designated Biodiversity and Geological Conservation – the Council seeks to maintain or enhance sites of geological value throughout the City. Developers will be expected to make appropriate provisions for long-term management of geological features connected to the development. ▪ Policy EN17 Water Quality – development should avoid adverse impacts on water quality, manage surface water runoff through sustainable drainage systems, secure the remediation of contaminated land, and minimise potential for urban diffuse pollution. The following polices have not been updated by PfE. ▪ Policy EN18 Contaminated Land and Ground Stability – the Council will give priority for the remediation of contaminated land to strategic locations. ▪ Policy EN20 Minerals – ensuring mineral resource safeguarding, encourage efficient use of minerals, promote use of secondary/recycled aggregates, minimise adverse environmental impacts of storage, processing and transfer.
Places for Everyone Joint Development Plan 2022 to 2039	The plan talks about the effective use of land resources, directing development away from valuable soils, maximising the contribution of brownfield land to development and adopting a “brownfield preference” policy to try and ensure that brownfield sites come forward in the early part of the plan period and the ongoing need to secure additional government funding to support brownfield regeneration. Numerous policies discuss the requirement for selecting and bringing brownfield land forward for redevelopment as early as possible but the most relevant policy is: ▪ Policy JP-S1 Sustainable Development – particular attention will be paid to tackling land contamination and stability issues, ensuring that appropriate mitigation and remediation is implemented to enable sites to be brought back into use effectively. Additionally, policy JP-G8 discusses the need to protect sites designated for their nature conservation and/or geological importance and safeguarding, restoring and sustainably managing the most valuable soils resources.

[5] Environment Agency (2022) River basin management plans: updated 2022 - GOV.UK (www.gov.uk) [Accessed 06 February 2024]

[6] Gov.UK (1981) Wildlife and Countryside Act 1981 (legislation.gov.uk) [Accessed 06 February 2024]

Legislation/regulation	Summary of requirements
Greater Manchester Mineral Plan (2013)[7]	Sets out policies to guide future minerals development and identifies Areas of Search and Mineral Safeguarding Areas in order to meet aggregate requirements and to protect minerals resources across Greater Manchester to 2028.
Unitary Development Plan 1995: Citywide Development Control Policies	The Unitary Development Plan (UPD) for the City of Manchester was adopted in 1995 with significant elements of the UPD being replaced by the Core Strategy in 2012. However, the Citywide Development Control Policies is an extant UPD policy which includes: Policy 28 Minerals – the council will seek to protect known mineral resources and features of geological interested should be protected as far as possible. The policy also provides further details on where mineral exploitation will be permitted along with other restrictions and requirements for mineral applications.

12.3.2. Table 12-2 below summaries the Technical Standards and Guidance applicable to this ground conditions and contamination chapter.

Table 12-2 – Technical standard and guidance for ground conditions

Technical standards / guidance	Summary of requirements
Contaminated Land Statutory Guidance, 2012[8]	Assist with deciding whether land is legally defined as "contaminated land". It also elaborates on the remediation provisions of Part 2A, such as the goals of remediation, and how regulators should ensure that remediation requirements are reasonable.
Land Contamination Risk Management (LCRM), 2023[9]	The overarching process used to ensure a site or development will not present unacceptable risk to those occupying, using or otherwise affected by it.
BS 10175:2011+A2:2017 (2017)[10]	Recommendations and guidance on the investigation of land that could potentially be affected by contamination
Planning Practice Guidance 'Land affected by contamination'[11]	With regard to contamination the implications of contamination for a new development should be considered by the local planning authority to the extent that is not addressed by other regimes. Whilst responsibility for securing a safe development rests with the developer and/or landowner, the PPG states that local planning authorities should be satisfied that a Development, along with any necessary remediation works or proposed mitigation measures, will be appropriate for its location and not pose an unacceptable risk. With regard to land stability, PPG identified that the planning system has an important role in; minimising the risk and effects of land stability, ensuring that specific types of development are not placed in unstable locations

[7] Manchester City Council (2013) Greater Manchester Joint Minerals Development Plan Documents | Manchester City Council [Accessed 06 February 2024]

[8] Department for Environment & Rural Affairs (2012) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/223705/pb13735cont-land-guidance.pdf [Accessed 06 February 2024]

[9] Environment Agency (2023) Land contamination risk management (LCRM) - GOV.UK (www.gov.uk) [Accessed 06 February 2024]

[10] BSI (2017) BS 10175:2011+A2:2017 Investigation of potentially contaminated sites, Code of practice.

[11] Gov.UK (2019) Land affected by contamination - GOV.UK (www.gov.uk) [Accessed 06 February 2024].

Technical standards / guidance	Summary of requirements
	without suitable precautions being implemented and should wherever possible bring unstable land back into productive use.
CIRIA C552	Sets out the risk assessment process by describing the stages involved in identifying contaminated land hazards, defining probabilities of the risk occurring and consequences if the risk occurs and then defining the overall contaminated land risks.
Department for Communities and Local Government. Environmental Impact Assessment: A guide to good practice and procedures [12]	Explains requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017

12.4. Assessment methodology

Study area

12.4.1. To consider the effects of the Proposed Development on ground conditions and contamination, the study area is defined as the area within the Proposed Development boundary (the Site) and land immediately beyond up to a distance of 250 metres (m).

Methodology

12.4.2. The general approach to the ground conditions and contamination assessment comprises:

- Updating the baseline conditions for the study area with the recent ground investigation information;
- Identification of potential impacts on identified resources and receptors from the construction and operational phases of the Proposed Development;
- Assessment of the significance of likely impacts and effects from the Proposed Development including the consideration of embedded mitigation;
- Identification of any additional mitigation measures or enhancements and residual effects; and
- Identification of any cumulative effects.

Physical Effects, Soils Re-use and Waste Soils

12.4.3. The assessment of the potential physical effects (soil erosion) and the effects associated with soil re-use and waste soils will be undertaken using a qualitative approach considering the effects of the construction and operation phases of the Proposed Development. In addition, high level comments will be provided in Section 12.6 in relation to ground stability / subsidence, soil compaction, faults, mining, changes in topography and effects on geology as a valuable resource.

12.4.4. The baseline information in relation to ground conditions of the study area will be reviewed and considered in the context of construction and operation of the Proposed Development and methods to determine if impacts are likely. The assessment will be informed by the works required and the construction and operation methods proposed at the time of reporting including enabling and temporary

[12] Department for Communities and Local Government (2014), *Environmental Impact Assessment: A guide to good practice and procedures.*

works, earthworks, proposed foundations and structures, and construction methods. Where information is not available, appropriate assumptions based on similar sites will be used.

12.4.5. The impacts have then been assessed using the sensitivity of the receptors and magnitude of impact to consider the significance of the effect as described further below. A sensitivity has been assigned to each receptor using the criteria detailed in Table 12-3. Where the attribute falls within two sensitivity criteria, the worst-case sensitivity is selected.

Table 12-3 – Assigning receptor sensitivity – physical effects

Sensitivity	Criteria	Description
High	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. Attribute has a very low capacity to accommodate the proposed change.	Major ground stability, soil compaction or erosion hazards currently present at the Site. High potential for soils re-use
Medium	Attribute possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. Attribute has a low capacity to accommodate the proposed change.	Moderate ground stability, soil compaction or erosion hazards currently present at the Site. Moderate potential for soils re-use
Low	Attribute only possesses characteristics which are locally significant. Attribute has some tolerance to accommodate the proposed change.	Low ground stability, soil compaction or erosion hazards currently present at the Site. Limited opportunity for soils re-use.
Very Low	Attribute characteristics do not make a significant contribution to local character or distinctiveness. Attribute is generally tolerant and can accommodate the proposed change.	No ground stability, soil compaction or erosion hazards currently present at the Site. No opportunity for soils re-use.

12.4.6. Following determination of the sensitivity of the receptors, the magnitude of potential impacts are determined. The criteria for the assessment of impact magnitude for physical effects and effects associated with waste soils and soil re-use are defined in Table 12-4.

Table 12-4 – Assigning magnitude of impact – physical effects

Magnitude of Impact	Description
High	Total loss of major alterations to one or more of the key elements, features or characteristics of the baseline. The situation will be fundamentally different.
Medium	Partial loss or alteration to one or more of the key elements or characteristics of the baseline. The situation will be partially changed.
Low	Minor loss or alteration to one or more of the key elements, features or characteristics of the baseline. The change will be discernible but the underlying situation will remain similar to the baseline.
Very Low	Very minor loss or alteration to one or more of the key elements, features or characteristics of the baseline, such that the change will be barely discernible, approximating to the 'no change' situation.

12.4.7. The overall potential significance of physical effects and effects associated with waste soils and soil re-use is defined using the matrix presented in Table 12-5 below, which describes the relationship between the sensitivity of the receptor and the magnitude of the potential impact.

Table 12-5 – Assigning significance of effect – physical effects

		Magnitude of impact (degree of change)			
		Very Low	**Low**	**Medium**	**High**
Sensitivity of receptor	**Very Low**	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

12.4.8. Physical effects and effects associated with waste soils and soil re-use are described as adverse/negative or beneficial/positive, major, moderate, minor or negligible considering the sensitivity of the receptor, area over which the impact may occur, whether the impact is direct or indirect, the duration of the impact (short-term: less than three years; medium term: three to ten years; or long-term: more than ten years), and whether the impact is permanent or temporary. The categories of physical effects are described in Table 12-6.

Table 12-6 – Classification of effects – physical effects

Classification	Effect
Major adverse	Major soil erosion, soil compaction or ground instability that is permanent in nature. The generation of major volumes of soils classified as hazardous waste requiring off-site disposal.
Moderate adverse	Moderate soil erosion, soil compaction, or ground instability that is either permanent or long-term in nature. The generation of moderate volume of waste requiring off-site disposal.
Minor adverse	Limited medium-term soil erosion, soil compaction, or ground instability. The generation of a minor amount of waste soil requiring off-site disposal
Negligible	No measurable impact on soil erosion, soil compaction, waste volumes, or ground instability or impacts that are only temporary in nature (less than three years).
Minor beneficial	Limited medium-term reduction in existing soil erosion, soil compaction, or ground instability issues. A minor amount of materials re-use on-site, thereby reducing off-site disposal volumes
Moderate beneficial	Moderate permanent or long-term reduction in existing soil erosion, soil compaction, or ground instability issues. A moderate amount of materials reuse as part of the development, thereby reducing off-site disposal volumes by a significant extent
Major beneficial	Major permanent reduction in existing soil erosion, soil compaction or ground instability issues. Sustainable reuse of materials on-site with no, or only minimal, off-site disposal of waste soils.

12.4.9. Following the classification of an effect, a clear statement is made as to whether the effect is 'significant' or 'not significant'. For physical effects, soil reuse and waste soils, major and moderate effects will be classed as significant and minor and negligible effects not significant, in accordance with standard EIA practice. However, professional judgement is also applied where appropriate.

Land contamination effects

12.4.10. The assessment of the potential impacts of the Proposed Development on land contamination will consider the risks to various receptors from land contamination and the change in this risk profile during construction and operation. The assessment will be undertaken over two stages:

- Stage 1 – a land contamination risk assessment; and
- Stage 2 – a land contamination impact assessment.

Stage 1 – Contamination Risk Assessment

12.4.11. The approach for the Stage 1 contamination risk assessment is based on LCRM and the Good Practice Guide to EIA. The process will entail the development of an initial CSM from the baseline information and subsequent CSMs for the construction and operational phases considering the potential sources, pathways and receptors present.

12.4.12. The level of risk will then be ascertained by the estimation of probability and consequence of the risk in accordance with CIRIA C552[13]. Definitions of probability and consequence, as presented in CIRIA C552, are provided in ES (Volume 4) Appendix 12.3 and the level of risk is identified using Table 12-7.

Table 12-7 – Estimate of Land Contamination Risk Level by Comparison of Consequence and Probability

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability / Likelihood	**High Probability**	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Probability	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Modera/Low Risk	Low Risk	Very Low Risk	Very Low Risk

Stage 2 – Contamination Impact Assessment

12.4.13. The approach to the contamination impact assessment will entail undertaking land contamination risk assessments as described above for each of the following:

- **Baseline stage:** development of an initial CSM for the Site based on its current sources, pathways and receptors and an assessment of the current land contamination risks.
- **Construction stage:** development of the predicted CSM and risk assessment for the construction phase, addressing the potential for new sources of contamination to be introduced to the Site and the change in pathways and receptors.
- **Operational stage:** the predicted CSM for the Proposed Development, reflecting the final Site conditions including the status of contamination sources and the changes in the receptors.

[13] CIRIA (2001) Contaminated land risk assessment. A guide to good practice (C552)
https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C552&Category=BOOK [Accessed on 06 February 2024]

12.4.14. The impact assessment then requires comparison of the baseline risk assessment with the construction phase and operational phase risk assessments. This approach enables changes in the contaminated land status during each phase to be identified, an assessment of the effects to be made and appropriate mitigation measures specified.

12.4.15. The effects of the Proposed Development are then described as adverse/negative or beneficial/positive, major, moderate, minor or negligible as detailed in Table 12-8.

Table 12-8 – Classification of effects – land contamination

Classification	Effect
Major adverse	An increase in contamination risk from the existing baseline conditions of four or five risk levels in the risk matrix, e.g. land that has a very low contamination risk in the baseline becomes a high or very high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part IIA of the Environmental Protection Act 1990 ('Part IIA').
Moderate adverse	An increase in contamination risk from the existing baseline conditions of two or three risk levels in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate or high risk. Land that does not meet the statutory definition of Contaminated Land in the existing baseline becomes capable of being determined under Part IIA.
Minor adverse	An increase in contamination risk from the existing baseline conditions of one risk level in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate to low risk.
Negligible	No change in contamination risks.
Minor beneficial	A reduction in contamination risk from the existing baseline conditions of one risk level in the risk matrix, e.g. land that has a moderate to low contamination risk in the baseline becomes a low risk.
Moderate beneficial	A reduction in contamination risk from the existing baseline conditions of two or three risk levels in the risk matrix, e.g. land that has a high contamination risk in the baseline becomes a moderate/low or low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part IIA
Major beneficial	A reduction in contamination risk from the existing baseline conditions of four or five risk levels in the risk matrix, e.g. land that has a high contamination risk in the baseline becomes a moderate/low or low risk. Land that meets the statutory definition of Contaminated Land in the existing baseline is no longer capable of being determined under Part IIA

12.4.16. Following the classification of an effect, a clear statement is made as to whether the effect is 'significant' or 'not significant'. For land contamination, major and moderate effects will be classed as 'significant' and minor and negligible effects as 'not significant' in accordance with standard EIA practice.

12.4.17. It should be noted that, given the information known at the time of writing, professional judgement has been applied in certain circumstances where the introduction or removal of a receptor or pathway has automatically triggered a minor adverse or minor beneficial effect.

Assumptions and limitations

12.4.18. Assumptions on ground conditions and contamination impacts has been made based on the data available at the time of reporting and current understanding of the Proposed Development. Information for ground conditions and contamination has been sourced from available desk-based information plus relevant ground investigation data for the Proposed Development obtained by e3p in 2017 [14] and AtkinsRéalis in 2023 [15], both available in the ES (Volume 4) Appendix 12.

12.4.19. It has been assumed that embedded mitigation will take place prior to and / or during construction.

12.4.20. Stockpiling of materials and any landscape bunds would remain within the Site boundary.

12.4.21. There will be short term exposure of soils during construction although best practice site management procedures will be implemented which will minimise short term exposure risk.

12.4.22. Construction activities, such as earthworks, piling, installation of drainage and other below ground services may introduce new pathways for migration of existing contamination and exposure of contaminated soil, remobilisation of contaminants through soil disturbance and the creation of preferential pathways for surface water run-off and ground gas migration.

12.4.23. The construction work activities could potentially generate contaminated dust and vapours.

12.4.24. This chapter provides an initial indication of chronic long-term risks to construction and maintenance workers. Short-term acute risks will be assessed, managed and mitigated by the Contractor with appropriate risk assessments and methods statements, and subsequent control measures.

Consultation

12.4.25. A Scoping Report (ES Volume 5 Appendix 4.1) was submitted to MCC on 30th September 2024 with a formal request for an EIA Scoping Opinion in accordance with Regulation 15 of the EIA Regulations.

12.4.26. A summary of the key points raised in the EIA Scoping Opinion relevant to the Ground Conditions chapter is presented in ES Volume 5 Appendix 4.2, including where the comments have been addressed within this chapter.

12.5. Baseline conditions

Current Site conditions

12.5.1. The Proposed Development is situated on the Site of a former retail park which was demolished in 2019 and the Site cleared down to ground. Hardstanding currently covers the majority of the Site. For the purpose of this assessment, the baseline has been identified as vacant land with hardstanding in place.

[14] e3p, 2017, Phase I and Phase II Geo-Environmental Site Assessment

[15] AtkinsRéalis UK Limited, 2023, Ancoats, Manchester – Ground Investigation Report

Historical development

12.5.2. The history of the study area has been determined principally by reference to the historical maps dated from 1848 to 2023 presented in the Groundsure Report[16], as well as the Phase I and II Geo-environmental Site Assessment report previously prepared by e3p[17]. A summary of the historical development is shown in Table 12-9 – below.

Table 12-9 – Summary of historical development

Map and scale	On-Site	Off-Site (within 250 m)
1848 to 1851 1:10,560	The earliest available mapping for the Site shows it to be located within an urban setting with terraced residential homes and other buildings occupying the Site. There are four main streets that run through the Site from north-east to south-west namely; Allum Street, Newton Street, Fawcett Street and John Street. Allum Street Foundry (Engine and Mill Works) and part of Allum Street Mill (Cotton) are mapped present in the north-western corner of the Site. A wood yard is mapped in the approximate centre of the Site. An oil cloth manufactory, machine manufactory, and iron foundry are mapped as present in the south-western section of the Site. Shooter Brook Iron Works No. 1 is located in the southeast of the Site. Given the names of the roads other industry and commercial premises are likely to have been present on-site e.g. Baker Street, Mason's Court, Fawcett Street, Smith's Court, Back Cotton Street, Pott Street Court.	The surrounding area is mapped as a mix of residential, commercial and industrial uses. Ancoats Street runs parallel to the south of the Site, Pott Street is on the south-eastern Site boundary and the Rochdale Canal is on the north-western boundary followed by Union Street. A coal yard and parts of Allum Street Mill and Allum Street Foundry are located on the north-eastern Site boundary and beyond. A smithy, cotton mill, spindle works, coal wharf, timber yard, iron works with associated boilers, chimneys, cranes, weighing machines and canals are mapped present approximately 20 m to 150 m north-east of the Site boundary. A coal wharf, colliery wharf, timber yard, wire mill and associated cranes and weighing machines are mapped present approximately 20 m south-west of the Site. A brass foundry, coal yard, part of the oil cloth manufactory and machine manufactory and cotton mills are mapped present from the north-western Site boundary and beyond.
1891 1:500	A saw mill is shown present in the location of the oil cloth manufactory and a timber yard is present in the south-western section of the Site. Allum Street Foundry and Mill buildings are still present on the map but not named. Schools are shown mapped on John Street and Little Newton Street with churches and rectories mapped present on Fawcett Street, and Little Newton Street.	No significant changes mapped, although a lot of the industrial buildings surrounding the Site are not named.

[16] Groundsure (2023) GS-N5Y-Y5P-M5I-37U

[17] e3p (2017) Phase I and II Geo-environmental Site Assessment Report (Ref. 11-834r1)

Map and scale	On-Site	Off-Site (within 250 m)
1894, 1896 & 1906 1: 10,560	No significant changes.	A clothing factory and disused foundry are mapped present to the south of the Site.
1908 & 1922 1:2,500	Corporation Yard is shown present on Little Newton Street within the centre of the Site. The various industrial uses noted on previous maps are no longer noted present. A recreational ground is mapped present on the south-eastern Site boundary at the location of former houses.	Long Mill, Old Mill, Sedgewick Cotton Mill; Murray Street Mill, cotton works, Corporation Yard and Stone Wharf, saw mills, hydraulic power station, tin works, iron & steel warehouse, tarpaulin works, timber yard, wharfs, clothing factory, dye works, glass works, engineering works, galvanizing works, flour mill, waterproof factory, timber shed, bedstead and safe works are located surrounding the Site.
1923 1:10,560	No significant changes.	No significant changes.
1931 to 1932 1:2,500	A sawmill is encroaching on the north-western corner of the Site (former Allum street foundry). Imperial Mill is mapped present in the north of the Site.	A lot of the previous industrial uses are still mapped as present with the addition of a sheet metal works, waste paper works, additional clothing mills / factories, cabinet works, and machine tools works within 250 m of the Site.
1934 to 1938 1:1,10,560	No significant changes.	No significant changes.
1952 to 1955 1:2,500	Garages and a timber shed are now mapped present in the approximate centre of the Site. A timber yard is mapped present in the west.	The majority of the industry remains present with the addition of an electricity sub-station, brass and iron works (Union Works) builders yard, soap works, corporate cleansing department, and paint works. The canal / basin to the north has changed in configuration.
1956 to 1968 1:10,560	No significant changes.	A hospital is mapped to the east of the Site.
1963 to 1969 1:2,500	A timber warehouse is mapped present in the south-west of the Site. An engineering works and unnamed works are mapped present in the north-west, a warehouse in the south and another warehouse in the centre of the Site. A lot of the previous houses are no longer mapped.	Generally, no significant changes with the addition of some garages, scrap metal yard, and tanks identified on the maps.
1971 1:1,250	A depot is mapped present in the south-west of the Site.	No significant changes.
1972 1:10,000	No significant changes.	No significant changes.
1978 1:1,250	No significant changes.	A lot of the industry noted present to the north-east of the Site has now been replaced by St Jude's Primary School located on the northern Site boundary and housing approximately 100 m north of the Site. The canal / basin to the north is no longer mapped present.

Map and scale	On-Site	Off-Site (within 250 m)
1981 to 1985 1:10,000	No significant changes.	Some further conversion of the industrial buildings to smaller residential buildings to the north-east.
1983 to 1985 1:2,500	No significant changes.	No significant changes.
1985 1:10,000	No significant changes.	No significant changes.
1990 to 1995 1:2,500	Maps show that the Site has been redeveloped into three large buildings which cover the north-eastern section of the Site with the south-western section appearing to be car parking. The buildings and car parking are assumed to be part of the “Central Retail Park”.	The saw mill, cabinet works, and later buildings noted as “works” mapped on the south-eastern boundary are now mapped as two large buildings with car parking and noted to be the “Central Retail Park”. Further residential buildings are mapped present to the north-east. Some former factories in the south-west are now mapped as garages. Factories in the west are still noted as present although some buildings are no longer mapped.
1991 to 1994 1:10,000	No significant changes.	Offices are noted present to the west of the Site.
2001 1:10,000	No significant changes.	No significant changes.
2003 1:2,500	No significant changes.	Two additional small buildings are mapped adjacent to the south-eastern Site boundary and part of the retail park. The area to the south-west across the road from Great Ancoats Street is now mapped as a car park with the former garages no longer mapped present.
2010 1:10,000	No significant changes.	The school to the north and residential housing to the north-east are no longer mapped present with parts of the former canals reinstated along with new canals mapped.
2023 1:10,000	No buildings are mapped present on-site, just part of a road on the northern Site boundary.	The former buildings of the Central Retail Park are no longer mapped present. An Educational Facility is mapped to the north of the Site and further development has taken place north of the canals.

Geology

12.5.3. There are no sites of geological interest, Local Geological Sites (LGS) formerly known as Regionally Important Geological Sites (RIGS)[18], or geological Sites of Special Scientific Interest (SSSI) within the study area. There are also no sensitive / valuable non-designated geological features within the study area.

[18] Greater Manchester RIGS* Group (2023) Sites Map – Greater Manchester RIGS* Group (gmrigs.org.uk) [Accessed on 06 February 2024]

Mapped geology

12.5.4. Reference to the Groundsure report indicates that no Made Ground or artificial ground is noted present beneath the Site. However, given the historical development of the Site and wider study area Made Ground is anticipated to be present.

12.5.5. The Groundsure report indicates the Site is underlain by Devensian Till comprising 'a heterogenous mixture of clay, sand and gravel'. The bedrock underlying the Site comprises the Chester Sandstone Formation.

BGS borehole logs

12.5.6. There are three BGS borehole logs noted present on-site and an additional 64 borehole logs within the study area. The borehole logs noted on-site were completed in 1999 and relate to the construction of St Jude's School (now known as Co-op Academy New Islington Primary School) to the north and are between 0.91 m and 4 m deep. TP25 and TP25A generally describe gravelly Made Ground of brick, limestone and sandstone up to 1.0 m below ground level (bgl) where a concrete obstruction was encountered that terminated the pits. TP28 recorded a thin layer of topsoil (0.16 m) underlain by another thin layer of sand and gravel (0.4 m) underlain by a firm to stiff clay to 4 m bgl. Groundwater was not encountered.

Faults

12.5.7. According to Groundsure there are no faults within the study area.

Natural ground subsidence

12.5.8. According to Groundsure the potential for natural ground subsidence due to shrinking or swelling clays, compressible deposits, running sands, collapsible deposits, ground dissolution and landslides within the study area is negligible to very low.

Mining & mineral safeguarding

12.5.9. According to the Groundsure report the study area is located in an area of known historical coal mining. e3p obtained a Coal Authority Mining Report in 2017 which identified that the Site could be affected by underground mining in three coal seams identified present between 360 m and 1090 m depth, and last worked in 1961. The report states that there are no known mine entries on or within 20 m of the Site. The report indicates that no notices have been issued stating that the land is at risk of subsidence and "*any movement in the ground due to coal mining activity should have stopped*". There are no plans to grant future licences.

12.5.10. The Greater Manchester Joint Minerals Plan[19] does not record any mineral sites (brick clay, aggregates, building stone, or coal) within the study area.

[19] Greater Manchester Joint Minerals Plan April 2013. https://www.manchester.gov.uk/downloads/download/5550/greater_manchester_joint_minerals_development_plan_documents [Accessed on 06 February 2024]

Hydrogeology

12.5.11. According to the Groundsure report the superficial Devensian Till deposits are designated as a Secondary Undifferentiated aquifer by the Environment Agency (EA). The Environment Agency defines Secondary Undifferentiated aquifers as "*where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type*".

12.5.12. The Chester Sandstone Formation bedrock is designated as a Principal aquifer. The Environment Agency defines Principal aquifers as "*Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale*".

12.5.13. The Groundsure report does not record any licensed potable groundwater abstractions within the study area. The study area is not located within a groundwater Source Protection Zone (SPZ).

Hydrology

12.5.14. The nearest surface water body recorded is the Rochdale Canal adjacent to the north-west Site boundary, with the Islington Wharf Marina approximately 30 m north-east and Ashton Canal approximately 175 m east. A summary of the WFD surface water ratings within the study area is presented in Table 12-10

Table 12-10 – Summary of WFD Surface Water Classifications

Location	Name	Waterbody ID	Overall rating	Chemical rating	Ecological rating	Year
Adjacent to north west Site boundary	Rochdale Canal, western section	GB71210517	Moderate	Fail	Moderate	2019
175 m east	Ashton Canal and Peak Forest Canal, lower section	GB71210219	Moderate	Fail	Moderate	2019

12.5.15. There is one historical licensed discharge to controlled waters immediately south-east of the Site which discharged treated sewage effluent into Shooters Brook until 1993 when the licensed was revoked.

Flood risk

12.5.16. The Environment Agency Risk of Flooding from Surface Water map shows there are small pockets of 'low' surface water flood risk which represent 0.1%–1% chance of flooding each year67.

12.5.17. The Environment Agency Risk of Flooding from Surface Water map shows that within the 1 km radius of the Proposed Development, there are areas of 'high', 'medium', and 'low' risk of surface water flood extent which represents – respectively – greater than 3.3%, 3.3–1%, and 1%–0.1% chance of flooding each year67. This has been addressed in ES (Volume 2) Chapter 19 Water Resources and Flood Risk.

12.5.18. The Groundsure report indicates that the majority of the Site is not at risk of surface water flooding as a result of extreme rainfall events. This is described as "*land naturally vulnerable to surface water ponding or flooding*". However, a small area in the eastern section of the Site is recorded as being at risk from surface water flooding from a 1 in 1,000 year event, with a flood depth of between 0.1 m and 0.3 m.

12.5.19. The Groundsure report also indicated that the majority of the Site is at low risk of groundwater flooding but an area in the west of the Site is classed as a moderate to high risk.

Contamination and pollution incidents

12.5.20. The Groundsure report records three pollution incidents within the study area, as summarised in Table 12-11 below.

Table 12-11 – Summary of Pollution incidents

Location	Details	
7 m north-west	Incident Date: 22/05/2001 Incident Identification: 6328 Pollutant: Contaminated Water Pollutant Description: Other Contaminated Water	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
13 m north-west	Incident Date: 17/05/2001 Incident Identification: 5825 Pollutant: Contaminated Water Pollutant Description: Other Contaminated Water	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
204 m south-west	Incident Date: 22/02/2003 Incident Identification: 138638 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

Landfill and waste facilities

12.5.21. The Groundsure report indicates that there no historical or current registered landfill sites located within the study area.

Unexploded Ordnance (UXO)

12.5.22. A review of the online unexploded bomb risk maps provided by Zetica[20] indicates that the study area is in a moderate risk area for encountering UXO related to WWII bombs. A moderate risk is described by Zetica as areas indicated as having a bombing density of 15 to 49 bombs per 1,000 acres.

12.5.23. A Detailed UXO Threat & Risk Assessment was completed by 6 Alpha Associates in 2018[21] whereby a medium site risk was confirmed. 6 Alpha Associates also confirmed the following:

- The most likely source of UXO contamination is from German bombs and British projectiles used to defend against the raids;
- 6 Alpha Associates do not believe that there is significant risk to warrant on site pro-active risk mitigation measures;

[20] Zetica (2023) https://zeticauxo.com/downloads-and-resources/risk-maps/ [Accessed on 06 February 2024]

[21] 6 Alpha Associates, Detailed Unexploded (UXO) Threat & Risk Assessment, Project Number P6703,. June 2018

- Whilst the Site was subject to bomb strikes they were not designed to penetrate buildings or the ground. Given the extensive site redevelopment that has previously occurred, it is very likely any incendiary bombs which had failed to function would have been encountered previously.

12.5.24. The following reactive risk mitigation measures were recommended by 6 Alpha Associates during future groundworks on Site:

- Operational UXO Emergency Response Plan;
- UXO Safety & Awareness Briefings;
- On-Call Explosive Ordnance Disposal (EOD) Engineer.

Radon

12.5.25. Information from the Groundsure report indicates that the study area is within" *a low probability radon area, as "less than 1% of the homes are above the action level*."

Sensitive Land Uses (for contamination receptors)

12.5.26. According to the Groundsure report, there are no environmental designations such as SSSIs, SPAs, SACs, ancient woodlands, nature reserves within the study area. The study area is however within a SSSI impact risk zone and the Site is classed as an open mosaic habitat which are described as "*brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates*."

12.5.27. According to Groundsure there are 23 Listed Buildings within the study area; these are generally Grade II or II* listed and mainly relate to former industries in the area including mills, warehouses and canals. The Site is adjacent to a conservation area, designated in 1989.

Previous Ground Investigations

e3p 2017

12.5.28. In 2017, a pre-demolition ground investigation (GI) was completed by e3p (ES Volume 4 Appendix 12.1) comprising a combination of window sample, cable percussive and rotary boreholes, 21 of which were located within the Site.

12.5.29. Made Ground, generally between 0.5 m and 2.0 m thick, was recorded on the Site as a variable gravelly sand and sandy gravel with materials including clinker, brick, ash, limestone, mudstone, slate, timber and rare porcelain. Made Ground was found to be of greater thickness in the east of the Site, with a maximum thickness recorded of 5.1 m in the north-east corner. No visual or olfactory evidence of hydrocarbon impacted soil or groundwater was observed.

12.5.30. Superficial Deposits were recorded to be stiff gravelly and sandy gravelly Clay with local horizons of more silty Clay. Within the deeper boreholes the superficial deposits were proven to a maximum depth of 29 m bgl. Bedrock deposits comprised upper weathered horizons of Sandstone, becoming rock at depths of between 24.5 m and 33 m bgl on-site.

12.5.31. Groundwater monitoring and modelling completed by e3p indicated shallow groundwater at depths of between 0.19 m and 4.5 m bgl, and deeper groundwater on-site between 21.0 m and 24.5 m bgl. One exceedance of the arsenic DWS was identified within BH104.

12.5.32. Ground gas monitoring undertaken by e3p classified the Site as Characteristic Situation 1 defined as a very low hazard potential, and therefore would not require the use of gas protection measures within

proposed structures. Methane was recorded below the level of detection in the available monitoring wells, with the exception of WS105 where a concentration of 0.1% v/v was recorded. A maximum carbon dioxide concentration was recorded in WS116 at 0.9% v/v.

12.5.33. Laboratory testing undertaken on samples taken during the investigation identified loose Chrysotile fibres and elevated concentration of lead within WS109 at 2.9 m bgl. The loose Chrysotile fibres were identified within the granular Made Ground and the elevated lead result exceeded the screening criteria for a residential without plant uptake use. However, the lead concentrations at 1,600mg/kg do not exceed a commercial end use screening criteria.

12.5.34. On completion of the investigation works, e3p undertook a contaminated land generic quantitative risk assessment (GQRA) for the Site using the data collected. e3p concluded that significant site-wide contamination and a subsequent significant risk to human health or controlled wates had not been identified. Evidence of potentially volatile or soluble hydrocarbons was not noted present by e3p and the ground gas monitoring indicated no gas protection measures would be required in the redevelopment.

AtkinsRéalis 2023

12.5.35. In 2023, AtkinsRéalis undertook an intrusive ground investigation and ground conditions assessment (ES Volume 4 Appendix 12.2) comprising 12 cable percussive boreholes with rotary core follow, eight window sample boreholes, 13 machine excavated trial pits, two hand dug pits and 22 in-situ static cone penetration tests. The investigation covered the majority of the Site, with the exception of the adjacent land which is proposed to be used for a site compound.

12.5.36. Made Ground was encountered across the Site and comprised concrete, asphalt and brickwork at ground surface. Granular Made Ground, to a maximum depth of 3.5 m bgl, was encountered across the locations investigated and comprised either fine to coarse gravel of sandstone and concrete, or fine to coarse sand. Cohesive Made Ground was also encountered across these locations and was generally described as slightly sandy slightly gravelly clay. Hydrocarbon odours were noted in TP01, TP05 and TP08.

12.5.37. Cohesive Glacial Till was encountered directly beneath the Made Ground, while granular Glacial Till was not encountered until 4.2 m bgl. The cohesive Glacial Till was encountered between 0.3 m bgl and 26.50 m bgl and generally comprised slightly gravelly, slightly sandy, slightly silty Clay. The granular Glacial Till was encountered as bands of varying thickness between 4.4 m bgl and 29.5 m bgl and was generally described as either fine to coarse Gravel or fine to coarse Sand.

12.5.38. The Chester Formation (Sandstone) was encountered within all boreholes completed during this 2023 ground investigation. The bedrock generally comprised 1 m to 2 m of weathered rock above less weathered, competent rock. The competent rock was generally described as extremely weak to weak fine to medium Sandstone and was encountered from depths between 24.4 m and 29.5 m bgl.

12.5.39. Six gas monitoring visits were completed following the ground investigation. The maximum carbon dioxide concentration recorded within an unflooded well was 7.3 % v/v in WS05. The maximum methane concentration recorded was 35.4 % v/v in BH09. Both of these concentrations were recorded within the Made Ground. The maximum gas concentration from an unflooded well 7.3% v/v in WS05 and maximum steady state flow rate of 0.8 l/hr in BH05 were used to calculate a GSV. The Site was classified as Characteristic Situation 1 or “very low risk”.

12.5.40. Thirty four soil samples were retrieved and tested for a range of contaminants, no exceedances of the relevant human health assessment criteria protective of a commercial end use were recorded within the samples analysed. Asbestos identification was scheduled on the 34 soil samples and no positive identifications were recorded.

12.5.41. Eighteen soil samples were scheduled for soil-leachate analysis, all of which were collected from the unsaturated zone. Exceedances of the DWS and EQS were reported, predominantly metals, Polycyclic Aromatic Hydrocarbons (PAHs) and Total Petroleum Hydrocarbons (TPHs). However, given current site and ground conditions, the assessment concluded that it was considered unlikely that the contaminants recorded present within the shallow soils would pose an unacceptable risk to controlled waters.

12.5.42. Nine groundwater samples were collected from wells which were screened in the Made Ground, superficial deposits and bedrock. Exceedances of both the DWS and EQS were reported for metals and TPHs. The controlled waters risk assessment concluded that it was unlikely that contaminants recorded in the groundwater would present an unacceptable risk.

Initial Conceptual Site Model and Risk Assessment

12.5.43. Primary guidance for assessing and managing land contamination is presented in Land Contamination Risk Management (LCRM)[22] and BS 10175:2011+A2:2017[23] . This guidance provides a technical framework for identifying and remediating contamination through the application of a risk management process. The question of whether risk is unacceptable in any particular case involves not only scientific and technical assessments, but also appropriate criteria by which to judge the risk and conclude exactly what risk would be unacceptable.

12.5.44. An initial Conceptual Site Model (CSM) has been developed, based on available information, to assist in the assessment of the potential land contamination. The initial CSM describes the relationship between potential sources of contamination (resulting from both on and off-site historical and recent activities) and receptors to the potential contamination. As part of the initial CSM development, three elements are identified and assessed:

1. Source of contamination and associated contaminants;
2. Receptors (human beings, controlled waters, ecological systems and property) to contamination; and
3. Pathways between the sources and receptors.

12.5.45. Where all three elements are present or are likely to be present, they are described as potential contaminant linkages (PCLs), which can then be subjected to the risk assessment and risk management process.

Initial Conceptual Site Model

12.5.46. An initial CSM has been developed along with a preliminary risk assessment with respect to each identified PCL and current Site conditions (baseline stage) and is presented below. The preliminary risk categorisations presented are based on an assessment of the potential consequence of each PCL occurring along with the likelihood that each PCL will occur. Potential contaminants have been identified through reference to Department of the Environment (DoE) Industry Profiles[24] for land uses on or adjoining the Site where appropriate and other authoritative guidance.

12.5.47. Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law,

[22] Land Contamination Risk Management guidance, Land contamination risk management (LCRM) - GOV.UK (www.gov.uk) [Accessed 12 February 2024]

[23] BSI, BS10175:2011+A2:2017, Investigation of potentially contaminated sites: Code of Practice

[24] Department of the Environment (DoE) Industry Profiles, published 1995 https://www.claire.co.uk/useful-government-legislation-and-guidance-by-country/198-doe-industry-profiles [Accessed 12 February 2024]

specifically the Construction Design Management (CDM) Regulations, 2015[25] which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps are taken to eliminate / manage that risk. It has been assumed that any future construction and maintenance works on-site will be undertaken in compliance with these requirements, and as such, have been discounted from the initial CSM.

Risk Estimation

12.5.48. Through consideration of the potential consequence and probability / likelihood of exposure occurring, a potential risk rating for each PCL has been assigned and is presented in in ES (Volume 4) Appendix 12.3. The purpose of this assessment is to focus upon the potential risks present, based on the existing Site use. The definitions of estimated risk are taken from CIRIA C552[26] and are summarised below. The definitions of consequences and probabilities for each receptor are provided in ES (Volume 4) Appendix 12.3.

- **Very High Risk**: There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or, there is evidence that severe harm to a designated receptor is currently happening;
- **High Risk**: Harm is likely to arise to a designated receptor from an identified hazard;
- **Moderate Risk**: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild;
- **Low Risk**: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild;
- **Very Low Risk**: There is a low possibility that could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

12.5.49. The risk is evaluated through the probability matrix presented in Table 12-7.

Sources

12.5.50. Through a review of available historical and published information (e.g. geological, hydrogeological and hydrological information), potential sources of contamination and associated contaminants were identified and/or discounted. Those sources/contaminants that are not discounted were then considered in relation to potential receptors that may be harmed by the source, and potential pathways that may link the sources to the receptors, i.e. source-pathway-receptor relationship.

12.5.51. A number of historical and current land uses have been identified on the Site and within 250 m of the Site which may have given rise to contamination.

On-site

- Identified asbestos, arsenic, TPHs, VOCs/SVOCs from the Made Ground encountered on-site;
- Potential unidentified contamination from the historical industrial land uses on-site including a foundry / iron works, wood yard, various mills, factories, various works, corporation yards, saw mill / timber yard, timber shed, garage, depot and retail park.

[25] Health and Safety Executive – The Construction (Design and Management) Regulations 2015 https://www.hse.gov.uk/construction/cdm/2015/index.htm [Accessed 12 February 2024]

[26] CIRIA C552 – Contaminated land risk assessment, a guide to good practice.

Off-site

- Disturbed ground, Made Ground and worked ground where present adjacent to the Site;
- Historical discharges to groundwater and surface water;
- Historical industrial land uses including Mills (cotton, cloth and flour), timber yards, saw mill, coal yard, coal / colliery wharfs, Infilled canal/wharf, smithy, spindle works, hydraulic power station, tin works, dye works, glass works, engineering works, machine tools works, galvanizing works, waterproof works, electricity substation, brass and iron works / foundries, paint works, soap works, hospital, scrap metal yard, and tanks.

Receptors

12.5.52. The following receptors have been identified at the Site based on the current end-use.

- Human Health:
  - On-Site: Pedestrians / trespassers, site visitors; and
  - Off-Site: neighbouring residents, members of public and neighbouring commercial property users/workers.
- Surface Water:
  - Rochdale Canal located adjacent to north-west boundary;
  - Islington Wharf located approximately 30 m north-east; and
  - Ashton Canal located approximately 175 m east.
- Groundwater:
  - Superficial Aquifers - Secondary Undifferentiated; and
  - Bedrock Aquifers – Principal Aquifer on and off-site and Secondary B aquifer off-site.
- Property receptors:
  - On-site property (existing services); and
  - Off-site property (existing structures and services such as residential and commercial properties, listed buildings, etc).
- Ecology receptors:
  - Habitats associated with on-site vegetation and off-site water features.

Pathways

12.5.53. Considering the identified receptors, a number of pathways are considered plausible based on the information gathered to date.

- Human Health:
  - Direct contact / ingestion of contaminants within Made Ground / soils or groundwater;
  - Inhalation of organic vapours from Made Ground / soils, soil derived dust, and groundwater;
  - Inhalation of dust and fibres from Made Ground / soils, soil derived dust;
  - Inhalation of ground gas;
  - Inhalation of asbestos fibres;
  - Direct contact / ingestion of contaminants within soils derived dust or groundwater migrating off-site;
  - Inhalation of organic vapours and asbestos fibres migrating off-site;
  - Inhalation of ground gases migrating off-site.

- Controlled Waters:
  - Leaching/dissolution from contaminated soils, followed by vertical migration;
  - Lateral migration of contaminants in groundwater;
  - Surface water run-off of mobile contaminants;
  - Migration via preferential pathways e.g. existing drainage.
- Property:
  - Chemical attack from aggressive chemical constituents in soil and groundwater;
  - Migration of gases into confined spaces/buildings and accumulation (explosion).
- Ecology:
  - Direct contact of habitats with contaminated soils, groundwater and surface water;
  - Migration of contaminated waters / dust / fibres and subsequent uptake by flora or ingestion / inhalation / dermal contact by fauna.

12.6. Potential impacts

12.6.1. The baseline has indicated that the potential for natural ground subsidence due to shrinking or swelling clays, compressible deposits, running sands, collapsible deposits, ground dissolution and landslides within the study area is negligible to very low. In addition, there are no faults within the study area and the ground conditions indicate limited Made Ground up to 2.0 m thick underlain by firm to stiff clay. Mining is present beneath the Site at depths greater than 360 m, but the Coal Authority Report indicates that any movement should have stopped and that the risk of subsidence is low. The Site is also relatively flat and this is unlikely to change as a result of the Proposed Development. Therefore, changes in topography, ground stability, and soil compaction have not been considered further in the assessment.

12.6.2. Effects on geology as a valuable resource have not been considered further in the assessment considering the absence of a safeguarded mineral resource or sensitive environmental designations such as geological SSSIs, Local Geological Sites (LGS) / RIGS.

12.6.3. The effects on soil as a valuable resource have not been considered further in the assessment as the Site is urban and soils have already been removed by previous development.

12.6.4. A summary of the potential impacts associated with ground conditions and contamination during construction and operation is presented below.

Construction

12.6.5. Physical effects arising from changes in soil erosion along with effects on land contamination, waste soils and soils reuse from the Proposed Development are discussed in more detail below.

Physical Effects: Soil erosion

12.6.6. There is likely to be increased temporary soil erosion from the removal of hardstanding, vegetation clearance, general earthworks, excavations, temporary stockpiling, piling, construction of new infrastructure and the movement of heavy plant. There is also the potential for increased runoff during earthworks carrying a high sediment load to affect surface water receptors.

Land contamination

12.6.7. The effects associated with land contamination have been assessed by comparing the baseline land contamination risks to those predicted during construction, while considering any new sources and pollution pathways introduced by construction activities. The construction phase CSM and risk assessments are included in ES (Volume 4) Appendix 12.3.

12.6.8. The construction phase could potentially introduce new sources of contamination and disturb and mobilise existing sources of contamination. Construction activities, such as excavation and piling may introduce new pathways for migration of existing contamination such as excavation and exposure of contaminated soil, remobilisation of contaminants through soil disturbance and the creation of preferential pathways for groundwater and ground gas migration. Potential changes to the baseline situation creating PCLs, which have been assessed within this chapter are:

- The potential for mobilising contaminants by excavation and stockpiling of material, increasing the risk to controlled water receptors through leaching and run-off. Earthworks could provide opportunities for run-off to contain suspended solids, if not managed properly;
- The potential for introducing new sources of contamination i.e. from spillages and leaks;
- The potential for exposure of human receptors by generation of potentially contaminated dust and vapours released by the construction works; and
- The potential for creation of new pathways to groundwater during groundworks, through opening up ground temporarily and construction activities, such as earthworks, piling, installation of drainage and other below-ground services.

Waste soils and soil re-use

12.6.9. Waste soils may be generated during construction through excavation works and during installation of services. There is the potential that waste soil generated during construction would be classified as unsuitable for re-use on-site or hazardous, therefore requiring removal from Site.

Operation

12.6.10. The following sections summarise the potential impacts from the Proposed Development during operation on soil erosion, land contamination, waste soils and soils re-use.

Physical Effects: Soil erosion

12.6.11. Impacts in relation to physical effects are considered to be mainly related to the construction phase. During operation, there will be limited impacts on soil erosion through maintenance operations which may include excavations for landscaping and for repairs, upgrades or installation of services and infrastructure.

Land contamination

12.6.12. The effects associated with land contamination have been assessed by comparing the baseline land contamination risks to those predicted during operation, while considering any new sources and pollution pathways introduced by operational activities. The operational phase CSM and risk assessments are included in ES (Volume 4) Appendix 12.3.

Waste soils and soil re-use

12.6.13. The Proposed Development may also generate limited waste soils during operation due to maintenance requirements which may include excavations for landscaping, repairs and maintenance of services.

12.7. Assessment of effects

Construction phase

Embedded mitigation

12.7.1. The following embedded mitigation measures are assumed to be incorporated into the design of the Proposed Development and will reduce impacts of physical effects and effects associated with land contamination, soil waste and soil re-use:

- Design in accordance with statutory guidance and best practice. The design would be required to take into account the ground conditions including the potential for ground movement, compaction, ground gas and ground aggressivity;
- Drainage design will consider the risks from residual contamination and use of appropriate drainage systems;
- Development of UXO Emergency Response Plan, implementation of UXO safety & awareness briefings and the use of an on-call EOD Engineer will be completed as appropriate.
- Incorporation of mitigation / remedial measures in the design to reduce impacts from soil erosion and contamination (as and if required);
- Derivation of re-use criteria and implementation of a Materials Management Plan (MMP) where soils are to be re-used on-site;
- Maximising the potential to re-use site-won soils in the Site redevelopment, minimise importation of soils and source local materials;
- Maximising the potential to re-use suitable site-won soils in redevelopment of adjacent parkland through implementation of a MMP to minimise importation of soils and source local materials;
    - Construction works and the re-use of material will be undertaken in accordance with best practice methods;
- Material used for soft landscaping will undergo the appropriate chemical testing prior to placement;
- A Construction Environmental Management Plan (CEMP) setting out construction related environmental mitigation measures will be prepared and submitted as part of this ES.

12.7.2. The construction mitigation measures to be included within the OCEMP will include:

- Development of health and safety risk assessments, method statements and use of appropriate Personal Protective Equipment (PPE) for the protection of construction workers in accordance with the COSHH Regulations[27];
- Implementation of appropriate dust suppression measures to prevent migration of contaminated dust and fibres as appropriate, as set out in ES (Volume 2) Chapter 7 Air Quality;
- Preparation of piling risk assessments as required in accordance with Environment Agency guidance[28] to assess and manage potential risks to controlled waters;

[27] Control of substances hazardous to health (COSHH) Health and Safety Executive https://www.hse.gov.uk/cleaning/topics/coshh.htm#:~:text=you%20must%20do-,Control%20of%20Substances%20Hazardous%20to%20Health%20(COSHH)%20Regulations%202002%20(,those%20resulting%20from%20serious%20spillages [Accessed 12 February 2024]

[28] Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention, National Groundwater and Contaminated Land Centre Report NC/99/73, Environment Agency 2001

- Working methods during construction to manage groundwater and surface water appropriately and ensure that there is no run-off from the works, any material / waste stockpiles, and storage containers into adjacent surface watercourses in accordance with Environment Agency guidance;
- Stockpile management (such as water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity) and timely removal of stockpiled soil to prevent generation of windblown dust and surface water run-off;
- Clear segregation between stockpiled material including imported material, excavated material stockpiled for re-use and excavated waste material stockpiled for treatment and / or off-site disposal;
- Limiting the area of earthworks at any one time to reduce temporary effects on soil erosion;
- Appropriate management of materials during the works in accordance with relevant regulations and best practise methods;
- Where waste soil is generated, it will be dealt with in line with the Government's waste hierarchy which is a guide to sustainable waste and material resource management;
- Implementation of appropriate pollution incident control e.g. plant drip trays and spill kits; and
- Implementing appropriate and safe storage of fuel, oils and equipment during construction in accordance with COSHH regulations[29].

Construction effects

Physical effects: Soil erosion

12.7.3. The construction phase of the Proposed Development may result in effects on soils erosion associated with breaking out of hardstanding, vegetation clearance, stockpiling, earthworks, construction of the basement and construction of new buildings, infrastructure and landscaping.

12.7.4. Earthworks, including areas for temporary works, are anticipated for the construction of the Proposed Development with temporary stockpiling of soils. There is therefore the potential for increased soil erosion and surface water run-off with a high sediment load which may impact local surface waters. Earthworks would be managed in accordance with the OCEMP and Earthworks Specification to minimise soil exposure as far as practicable. The impacts on soil erosion during the construction phase are therefore considered to be temporary, short-term, and direct.

12.7.5. Given that there are limited soil erosion hazards at the Site, the sensitivity of the receptor is classed as low. With the embedded mitigation measures set out in sections 12.7.1 and 12.7.2 the magnitude of the impact is considered to be very low. The overall effect is therefore considered to be negligible, and classed as not significant.

Land Contamination

12.7.6. Mitigation measures would be incorporated into the construction process as outlined in sections 12.7.1 and 12.7.2 above. These would include the adoption of working methods during construction and removal and reinstatement to manage groundwater appropriately, implementation of appropriate pollution incident control and implementation of appropriate and safe storage of fuel, soils and equipment.

[29] Control of substances hazardous to health (COSHH) Health and Safety Executive https://www.hse.gov.uk/cleaning/topics/coshh.htm#:~:text=you%20must%20do-,Control%20of%20Substances%20Hazardous%20to%20Health%20(COSHH)%20Regulations%202002%20(,those%20resulting%20from%20serious%20spillages [Accessed 12 February 2024]

12.7.7. The impacts on land contamination are considered to be permanent and direct. With the proposed mitigation measures adopted, the risks identified to human health, controlled waters, ecology and property receptors during construction are assessed as very low to moderate/low. Compared to the existing baseline, the level of risk to receptors has generally remained the same during the construction phase. Potential effects associated with land contamination during construction have therefore been assessed as negligible which are classed as not significant. A summary of the construction phase impact assessment is presented in Table 12-12.

Table 12-12 – Construction phase effects of the Proposed Development on land contamination after Embedded Mitigation

Receptor Group	Receptor	Baseline Risk	Construction Phase Risk	Effect	Significance
Human Health: On-site	Pedestrians / trespassers / Site Visitor	Very Low to Moderate / low	Very Low to Moderate / Low	Negligible	Not Significant
Human Health: Off-site	Members of the public, neighbouring residents and commercial workers	Very Low	Very Low	Negligible	Not Significant
Groundwater : On-site& Off-site	Superficial Secondary Undifferentiated Aquifer Bedrock Principal Aquifer and Bedrock Secondary B Aquifer (off-site)	Low	Low	Negligible	Not Significant
Surface Water: Off-site	Rochdale Canal Islington Wharf Marina Ashton Canal	Very Low	Very Low	Negligible	Not Significant
Ecology	On-site Flora & Fauna	Very Low	Receptor Not Present	Negligible	Not Significant
	Off-site Flora & Fauna	Very Low	Very Low	Negligible	Not Significant
Property	New and existing services and structures on-site.	Very Low to Low	Very Low	Negligible to Minor Beneficial	Not Significant
	Existing structures and services off-site	Very Low	Very Low	Negligible	Not Significant

Waste soils and soil re-use

12.7.8. Waste soils would be generated during construction through excavations for the basement and foundations and the installation of drainage/services. There is the potential that waste soil generated from the basement and earthworks would be classified as geotechnically and/or chemically unsuitable for reuse on-site or hazardous, therefore requiring removal from Site. Waste soils would be dealt with in accordance with the Site Waste Management Plan.

12.7.9. An MMP in accordance with the Definitions of Waste: Code of Practice (DoWCoP) would set out how material is managed on-site during construction and removal and reinstatement in accordance with appropriate guidance, to allow the sustainable re-use of suitable soils during the construction phase.

12.7.10. In line with the waste hierarchy, the design would seek, as far as reasonably practicable, to reduce the amount of soil/materials excavated and/or of a hazardous nature, to reuse and recycle waste soils/materials on-site where possible and to manage soils/materials suitably including off-site disposal of waste, if required, in accordance with relevant legislation. Therefore, the impacts associated with waste soils and soil re-use during the construction phase are considered to be temporary, short-term and direct.

12.7.11. Given that Made Ground has been encountered across the Site there is a moderate potential for soils reuse, the sensitivity of the receptor is classed as medium. With the embedded mitigation measures, the magnitude of the impact is considered to be low. The overall effect is therefore considered to be minor and therefore not significant.

Operation phase

Embedded mitigation

12.7.12. Environmental impacts are likely to be greatest during construction, with minimal impacts likely during operation. However, the operation of the Proposed Development may potentially introduce new sources of contamination and below ground services could create additional potential pathways for the migration of potential contamination which were not present at baseline.

12.7.13. It is assumed, for the purposes of this assessment, that those mitigation measures identified for the construction phase will be undertaken and will support the mitigation of risks during operation. It is also assumed that the Proposed Development will be operated in accordance with the relevant regulations, best practice guidance and pollution prevention reducing risks.

12.7.14. Example mitigation measures could include, but are not limited to, the following:

- Appropriate separation of foul and surface water run-off and implementation of controls such as the use of interceptors to ensure contaminated or silty water does not discharge to surface watercourse;
- Use of impermeable hardstanding or impermeable barriers beneath parking areas to minimise spilt fuels / oil and other leaks migrating towards the underlying groundwater;
- Segregation and containment of potentially hazardous household wastes isolated away from surface water drains;
- Implementation of suitable bunds around any oil tanks which may be required to be stored on the Proposed Development; and
- Minimise and control the use of herbicides and pesticides in landscaped areas.

Operation effects

Physical effects: Soil erosion

12.7.15. Physical effects are considered to be mainly related to the construction phase. During operation, there would be limited effects on soil erosion through maintenance operations. Suitable design and subsequent maintenance works would also minimise physical effects, and the Proposed Development would be operated in accordance with the relevant regulations and best practicable measures. The impacts on soil erosion during the operational phase are therefore considered to be temporary, short-term, and direct.

12.7.16. Given the above, the sensitivity of the receptor is classed as low. With the embedded mitigation measures the magnitude of the impact is considered to be very low. Therefore, it is considered that the overall effect would remain as negligible and is classed as not significant.

Land contamination

12.7.17. Environmental impacts are likely to be greatest during construction, with reduced impacts likely during operation.

12.7.18. It is assumed that the Proposed Development will be operated in accordance with the relevant regulations and best practice guidance in applying Best Available Techniques and pollution prevention. Maintenance work is also likely to be short term and infrequent. Works will be risk assessed, with method statements developed and best practice controls would be used to minimise potential exposure. The impacts on land contamination during the operational phase are considered to be permanent, short-term and direct.

12.7.19. With the implementation of embedded mitigation, risks identified to human health, controlled waters, ecology and property receptors during operation are assessed as very low to moderate / low. Compared to the existing baseline, the level of risk to receptors has generally remained the same. An overall negligible to minor beneficial effect is therefore concluded which is classed as not significant. A summary of the operational phase impact assessment is presented in Table 12-13.

Table 12-13 – Operational phase effects of the Proposed Development on land contamination after Embedded Mitigation

Receptor Group	Receptor	Baseline Risk	Operational Phase Risk	Effect	Significance
Human Health: On-site	Future site users / Site visitors	Receptor Not Present	Very Low to Moderate / low	Negligible	Not Significant
Human Health: Off-site	Members of the public, neighbouring residents and commercial workers	Very Low	Very Low	Negligible	Not Significant
Groundwater : On-site & Off-site	Superficial Secondary Undifferentiated Aquifer Bedrock Principal Aquifer and Bedrock Secondary B Aquifer (off-site)	Low	Low	Negligible	Not Significant
Surface Water: Off-site	Rochdale Canal Islington Wharf Marina Ashton Canal	Very Low	Very Low	Negligible	Not Significant
Ecology	On-site Flora & Fauna	Very Low	Very Low	Negligible	Not Significant
	Off-site Flora & Fauna	Very Low	Very Low	Negligible	Not Significant
Property	New and existing services and structures on-site.	Very Low to Low	Very Low	Negligible to Minor Beneficial	Not Significant
	Existing structures and services off-site	Very Low	Very Low	Negligible	Not Significant

Effects associated with waste soils and soil re-use

12.7.20. The Proposed Development may also generate limited waste soils during operation due to maintenance requirements which may include excavations for landscaping, repairs or maintenance of services. The Proposed Development would also be operated in accordance with the relevant regulations and best practice guidance. The impacts associated with waste soils and soils reuse during the operational phase are assessed to be temporary, short-term and indirect.

12.7.21. Given that there is less potential for soil reuse during the operational phase, the sensitivity of the receptor is classed as very low. With the embedded mitigation measures, the magnitude of the impact is considered to be very low. The overall effect is therefore assessed to be negligible and classed as not significant.

12.8. Additional mitigation and enhancement measures

12.8.1. No additional mitigation measures are considered necessary based on the negligible and minor impacts, and not significant effects identified to ground conditions and contamination through this assessment process.

12.8.2. Enhancement measures might be available during the detailed design process associated with soils reuse and materials management.

12.9. Residual effects

Construction

12.9.1. Residual effects relate to those impacts which remain following the implementation of embedded mitigation and additional mitigation measures. Allowing for the proposed embedded mitigation, no significant effects are anticipated during construction and no additional mitigation is considered necessary. Consequently, there are anticipated to be no residual effects.

Operation

12.9.2. Allowing for the proposed embedded mitigation, no significant effects are anticipated during operation and no additional mitigation measures are considered necessary. Consequently, there are anticipated to be no residual effects.

12.10. Cumulative effects

Cumulative effects

12.10.1. This section considers the cumulative effects of the Proposed Development (intra-project cumulative effects) and the Proposed Development interacting with other RFFPs (inter-project cumulative effects) from the perspective of impacts within the scope of the Ground Conditions topic.

Cumulative effects assessment

12.10.2. The further consideration of cross-topic intra-project and inter-project cumulative effects is reported in Chapter 22: Cumulative Effects.

Intra-project in-combination cumulative effects assessment (single project impacts) within topic

12.10.3. The focus of intra-project CEA is understanding how receptors may experience a number of different types of impacts from the Proposed Development at the same time. Within this topic assessment, the intra-project effects are considered within the Ground Conditions and Contamination assessment methodology and intra-project effects are as reported in the main assessment presented in section 12.7.

12.10.4. On the basis of the above, there are no intra-project cumulative effects from the assessment of Ground Conditions and Contamination to report.

Inter-project cumulative effects assessment (different project impacts) within topic

12.10.5. The inter-project cumulative effects assessment 'within topic' element for the ground conditions assessment has been completed with reference to the shortlist list of RFFPs that has been developed for the Proposed Development. The list is based on a review of all developments known to the planning system using the methodology described in Chapter 22: Cumulative Effects.

12.10.6. The RFFP short list has been screened to identify projects that are considered to have a realistic prospect of interacting with the Proposed Development from the perspective of the ground conditions assessment. The sift from the short-list to identify RFFPs that should be scoped into the inter-project CEA for ground conditions took into consideration;

- Construction Timeframes
- Distance from the Proposed Development
- Scale of the RFFP

12.10.7. The following eight RFFPs have been shortlisted:

- 128191/FO/2020 - Development comprising of five office buildings with flexible ground floor use at land between Ashton Canal and Pollard Street.
- 132574/FO/2021 - Development comprising 4 townhouses at Paradise Wharf.
- 126608/FO/2020 - Development of 66 residential units between Store Street and Ashton Canal.
- 135662/FO/2022 - Development of 154 Bedroom Hotel with ancillary café / bar / restaurant and gym adjacent to Great Ancoats Street and south of Laystall Street.
- 135675/FO/2022 - Development of two apartment buildings comprising 267 dwellings at Tariff Street.
- 137346/FO/2023 - Mixed use development comprising commercial floorspace and 256 residential units adjacent to Poland Street and between Naval Street and Jersey Street.
- 122598/FO/2019 - Mixed use development comprising 94 residential units consisting of townhouses and apartments as well as commercial floorspace at New Islington Marina.
- 128911/FO/2020 - Mixed use development consisting of office space and 89 residential units at Laystall Street.

12.10.8. The section that follows sets out the potential inter-project impacts that may arise and provides a qualitative analysis leading to a conclusion about whether there are likely to be significant cumulative effects that arise.

Potential inter-project impacts

Construction

12.10.9. Cumulative inter-project impacts on ground conditions could occur in conjunction with the RFFPs identified as relevant to the Proposed Development.

12.10.10. It is considered that due to their proximity to the Proposed Development, each RFFP has the theoretical potential to contribute to construction additive cumulative impacts on ground conditions and contamination during the construction phase through:

- Construction activities, such as earthworks, piling, installation of drainage and other below ground services that may introduce new pathways for migration of existing contamination and exposure of contaminated soil, remobilisation of contaminants through soil disturbance and the creation of preferential pathways for surface water run-off and ground gas migration which could migrate to the study site; and
- Construction work activities which could potentially generate contaminated dust and vapours which could migrate to the study site.

12.10.11. Mitigation measures will be implemented as part of the construction of the Proposed Development as outlined in Section 12.7. The other developments themselves will also be subject to the NPPF and legislation as set out in Section 12.3, meaning that they will require mitigation and control measures to be adopted during their construction through management plans to reduce impacts to the environment from ground conditions and contamination.

12.10.12. On the basis of the above assumptions, it is expected that the combined impact of these potential additive cumulative effects will not be greater than those effects predicted for ground conditions and contamination as outlined in this chapter. Therefore, negligible additive cumulative effects on ground conditions and contamination are anticipated, which are classified as negligible and not significant. No additional mitigation is required.

Operation

12.10.13. Cumulative inter-project effects on ground conditions could occur in conjunction with the RFFPs identified as relevant to the Proposed Development:

12.10.14. Environmental impacts are likely to be greatest during construction, with minimal impacts likely during operation, however it is considered that due to their proximity to the Proposed Development, each RFFP has the theoretical potential to contribute to operational additive cumulative impacts on ground conditions and contamination during the construction phase through:

- Maintenance activities which could cause soil disturbance and the creation of preferential pathways for surface water run-off and ground gas migration which could migrate to the study site; and
- Maintenance activities which could potentially generate contaminated dust and vapours which could migrate to the study site.

12.10.15. It is assumed, for the purposes of this assessment, that those mitigation measures identified for the construction phase will be undertaken and will support the mitigation of risks during operation. It is also

assumed that the Proposed Development will be operated in accordance with the relevant regulations, best practice guidance and pollution prevention reducing risks.

12.10.16. Mitigation measures will be implemented as part of the operation of the Proposed Development as outlined in Section 12.7. The other developments themselves will also be subject to the NPPF and legislation as set out in Section 12.3, meaning that they will require mitigation and control measures to be adopted during their construction and operation through management plans to reduce impacts to the environment from ground conditions and contamination.

12.10.17. On the basis of the above assumptions, it is expected that the combined impact of these potential additive cumulative effects will not be greater than those effects predicted for ground conditions and contamination as outlined in this chapter. Therefore, negligible additive cumulative effects on ground conditions and contamination are anticipated, which are classified as negligible and not significant. No additional mitigation is required.

Mitigation measures

12.10.18. No inter-project impacts are expected. As such no mitigation is required.

12.11. Summary and conclusions

12.11.1. The Site currently comprises hardstanding following the demolition of the former retail park in 2019. Ground investigations undertaken by e3p (ES Volume 4 Appendix 12.1) and AtkinsRéalis (ES Volume 4 Appendix 12.2) did not identify any exceedances of the human health screening criteria when screened against a commercial end-use. Asbestos was identified within one sample taken in the e3p ground investigation; no asbestos was identified within any samples analysed during the AtkinsRéalis ground investigation. A single arsenic exceedance of the DWS was identified by e3p, and several exceedances of both the DWS and EQS identified by AtkinsRéalis. The Site was classified as having a very low gas hazard potential from ground gas following both ground investigations.

12.11.2. The general approach to the ground conditions and contamination assessment comprised:

- Updating the baseline conditions for the study area with the recent ground investigation information;
- Identification of potential impacts on identified resources and receptors from the construction and operational phases of the Proposed Development;
- Assessment of the significance of likely impacts and effects from the Proposed Development including the consideration of embedded mitigation;
- Identification of any additional mitigation measures or enhancements and residual effects; and
- Identification of any cumulative effects.

12.11.3. The approach for soil erosion, soils re-use and waste soils was based on a qualitative approach considering the effects of the construction and operation phases of the Proposed Development. The assessment was informed by the works required and the construction and operation methods proposed at the time of reporting. The effects were classified using the sensitivity of the receptors and magnitude of the impact and the significance of the effect identified.

12.11.4. The approach for land contamination was based around two stages: a contamination risk assessment and then a contamination impact assessment. The Stage 1 contamination risk assessment was based on LCRM and the Good Practice Guide to EIA, with risk assessments developed for baseline, construction and operational phases. The level of risk was then ascertained by the estimation of

probability and consequence of the risk in accordance with CIRIA C552[30]. The Stage 2 contamination impact assessment involved individual comparisons between the baseline risk assessment and the construction and operational phase risk assessments.

12.11.5. A number of embedded mitigation measures are incorporated into the design of the Proposed Development, including that the design will be completed in accordance with current authoritative legislation, statutory guidance and best practice, design of drainage to consider risks from contamination, additional assessment of unexploded ordnance risk, mitigation to reduce impacts from soil erosion, derivation of suitable soils re-use criteria and appropriate chemical testing on soils re-used on-site including in areas of soft landscaping, implementation of a Materials Management Plan, maximising re-use of site-won soils and minimising importation of soils.

12.11.6. Environmental impacts are likely to be greatest during constriction, with reduced impacts likely during operation. Negligible to minor effects have been identified on soil erosion, land contamination, soils re-use and waste soils through the assessment process. These are classed as not significant.

12.11.7. The environmental assessment presented in this chapter has therefore concluded that, throughout the construction and operational phases, there will be no significant effects on ground conditions and contamination.

12.11.8. Following assessment, no additional mitigation is considered necessary. Enhancement measures may be available during the detailed design associated with soils reuse and materials management. Residual effects during construction or operation are not anticipated.

[30] CIRIA (2001) Contaminated land risk assessment. A guide to good practice (C552)
https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C552&Category=BOOK [Accessed on 06 January 2024]

Table 12-14 – Summary of effects

Resource / Receptor / affected group	Sensitivity	Activity or impact	Embedded design mitigation	Effect Magnitude Type Spatial extent Duration Likelihood	Significance of effect	Additional mitigation	Residual effect
Construction							
Soil erosion	Low	Removal of hardstanding, site clearance, earthworks and stockpiling of soils	Adherence to OCEMP and Earthworks Specification	Adverse Negligible Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Land contamination	Very Low - Medium	Removal of hardstanding, site clearance, earthworks and stockpiling of soils	Adherence to OCEMP and mitigation measures outlined in 12.7.1 & 12.7.2	Adverse Negligible Direct Local Permanent Unlikely	Not Significant	N/A	Not Significant
Waste soils and soils re-use	Medium	Removal of hardstanding, site clearance, earthworks and stockpiling of soils	Adherence to OCEMP and Materials Management Plan	Adverse Minor Direct Local Temporary Likely	Not Significant	N/A	Not Significant
Operation							
Soil erosion	Low	Maintenance activities	Proposed Development will be operated in accordance with the relevant regulations, best practice	Adverse Negligible Direct Local Temporary Unlikely	Not Significant	N/A	Not Significant

AtkinsRéalis

AtkinsRéalis Manchester
3 Piccadilly Place,
M1 3BN,
Manchester,
United Kingdom

T: +44 1612 453400

www.atkinsrealis.com